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a little less than one half of what it will be when nearest us in November, to within about 5 per cent of the maximum.

Jupiter sets at about 9 P. M. on September 1st and at about 5:40 P. M. on October 31st, only about forty minutes after sunset, so that toward the end of October it will not be an easy object for naked-eye observation. It moves about 11° eastward and 4° southward through *Libra* toward *Scorpio* during the two months.

Saturn is well on toward opposition with the Sun, rising shortly before 10 P. M. on September 1st and shortly before 6 P. M. on October 31st. It begins its retrograde motion on September 3d, and by the end of October it will move about 3° westward and 1° southward among the stars along the border line between *Aries* and *Taurus*. The ratio of minor to major axis of the rings as seen in the telescope diminishes very slightly, but remains about one third, and the minor axis is a little less than the diameter of the planet.

Uranus sets at about 2 A. M. on September 1st and at about 10 P. M. on October 31st. It is on the border-line between *Sagittarius* and *Capricornus*, and retrogrades, moves westward, until October 5th, and then moves eastward, but the whole motion is confined to a space about the size of the disc of the Moon. No bright stars are near it.

Neptune rises shortly before 2 A. M. on September 1st and shortly before 10 P. M. on October 31st. It remains in the constellation *Gemini* not far from *Castor* and *Pollux*.

PRESENTATION OF THE DRAPER GOLD MEDAL TO PROFESSOR CHARLES G. ABBOT.¹

The president of the Academy, Dr. REMSEN, announced the award of the Henry Draper Gold Medal to Professor CHARLES G. ABBOT, director of the astrophysical observatory of the Smithsonian Institution. He described briefly the establishing of a fund in support of the medal by Mrs. DRAPER, and gave a list of the eight previous awards. He called upon Director

¹ Following the National Academy Dinner at the Cosmos Club, Washington, D. C., on the evening of April 19, 1911.

CAMPBELL to state the reasons for the present award of the medal to Mr. ABBOT. Mr. CAMPBELL's statement follows:

"In the matter of opportunities for research in pure science, the astronomers of our country have fared well, and perhaps better than their colleagues in the other sciences. Astronomy has appealed to the imagination of men of means, who have provided observatories designed on a large scale, equipped with excellent instruments. As a loyal Californian, having absorbed something of the spirit of that splendid State, you may be expecting me to claim for my country the *biggest* telescopes in the world; but I am immensely more proud to say that we have the *best* telescopes. However, the successes of American astronomy are due only in part to the instruments. Here, as elsewhere, the man is more than the instrument. A 13-inch telescope, plus the smoky atmosphere of Pittsburg, plus a KEELER, were equal to the task of proving that every point in the ring system of *Saturn* revolves about the planet exactly as a moon at that point would revolve. Our mathematicians may complain that this equation is not strictly homogeneous, but this does not prevent us from recognizing that the third term, in the first member, is the all-important one.

"LANGLEY had not been engaged very long on the problem of how much heat and light we receive from the Sun before he made the little Allegheny Observatory famous. Several investigators had given attention to this problem before LANGLEY, but his sustained and able study made it essentially his own problem. It was one not easy of solution. The solar radiations are reflected and absorbed by the Earth's atmosphere; the radiations in different parts of the spectrum are affected differently; the varying proportion of aqueous vapor in our atmosphere is a strong disturbing factor; the instrumental difficulties are serious; and so on through a long list of difficulties to be overcome. When LANGLEY came to Washington he brought this problem with him. In due time he secured by good fortune the services of Mr. ABBOT as assistant. As Mr. LANGLEY gave more and more of his time to administrative duties and to fundamental problems of flight in our atmosphere, to which he made important contributions, ABBOT's responsibilities increased, and upon the death of LANGLEY he

inherited the problem. The two volumes of the *Annals of the Astrophysical Observatory* of the Smithsonian Institution are the records of his splendid work. They make due acknowledgment of Mr. LANGLEY'S contributions, and they explain modestly and in a straight-forward manner Mr. ABBOT'S improvements in the instruments and methods. They show that his result, 1.92 calories per square centimeter of surface normal to the solar radiations, at the Earth's mean distance, per minute, must be near the truth. The values obtained near sea-level in Washington, again at an altitude of more than a mile on Mount Wilson, and again at the highest point in the United States, nearly three miles above sea-level on Mount Whitney, are in almost perfect accord. ABBOT'S value of 1.92 calories differs about 35 per cent from LANGLEY'S latest value, 3.0 calories, but LANGLEY had so complete a confidence in Mr. ABBOT that I feel sure he would now recognize with us that the latter's values are the true ones.

"If we could call this rate at which the Earth receives solar radiation a constant, it would be for the Earth's dwellers one of the most important constants of nature. Those who have not realized that the Sun's radiation is the source of essentially all our energy need only to go with PEARY to the North Pole or with SHACKLETON to the South Pole to see what happens when the direct influence of the Sun is cut off from a *part* of the Earth's surface for a few months. Now the North and South Poles in their present conditions are rose gardens in comparison with what the tropics would be if the Sun's heat were cut off from the *whole* Earth for one month.

"But ABBOT strongly suspects that the solar radiation is variable, to the extent of about 8 per cent in the course of a few days. What could be more interesting than that our central body should prove to be a variable star? To settle the matter, the last Congress made a small appropriation to provide Mr. ABBOT with another observing station, to be located in southern Mexico, in order that simultaneous observations there and in California may determine whether the apparent variations are in the Sun itself or are due to local conditions in our own atmosphere. If the ups and downs of the energy curves determined simultaneously at these two stations, more than

two thousand miles apart, are in fair accord, we may then assume that the solar constant is not a constant.

"At the eclipse of January, 1908, Mr. ABBOT measured the heat radiations of the solar corona, thus applying his methods to that remaining part of the Sun which is visible only at times of total eclipse.

"Mr. ABBOT, the National Academy of Sciences has awarded to you the Henry Draper Gold Medal for research in astronomical physics. The president has detailed me to present, with extreme brevity, the reasons leading to this award. This duty has been especially pleasing, as you and I were prisoners together for a month on a little dot of a South Sea island, and on two occasions we worked side by side amongst the granite boulders on the summit of Mt. Whitney. Under these circumstances, I learned to know you pretty well personally, and my estimate of the value of the third term in the equation which connects up all your scientific work was greatly enhanced thereby. We have confidence that your results will be close to the truth, whether the Sun is a variable star or not."

President REMSEN then handed the medal to Mr. ABBOT, who said:—

"Mr. President, members of the Academy, and you my dear friend who have come so far to do me honor, I thank you for this beautiful medal. It is of high value in itself, but far more so because there goes with it the good opinions of good men, which are more precious than gold.

"When the first Draper Medal was awarded, besides the two values I have named, it also carried with it the memory of Dr. HENRY DRAPER, whose own work in the application of photography to astrophysics, and especially in the study of the solar spectrum, had been well worthy of honor. The medal was a token, too, of the devotion and liberality of Mrs. DRAPER; who, by the far-sighted way in which she has employed her means to establish the Henry Draper Memorial at the Harvard College Observatory, has enabled one of your former medalists, Professor E. C. PICKERING, to carry out a work which is of the highest value. It is hardly possible that even Dr. DRAPER, had he lived out his allotted years, could have contributed so

much to science as Mrs. DRAPER's timely gifts in his name have accomplished.

"But besides these several values which attached to the medal at its first presentation, it has now become associated with the names of your former medalists—LANGLEY, PICKERING, ROWLAND, VOGEL, KEELER, HUGGINS, HALE, and CAMPBELL. I know not how to express my sense of the honor you have done me by adding my name, however unworthy, to a list so illustrious.

"Mr. President, I propose a toast: 'To the honor of the former Henry Draper medalists! May their successors be their equals!'"